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(54) **SYSTEM AND METHODS FOR INTRAOPERATIVE GUIDANCE FEEDBACK**

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CPC A61B 17/15; A61B 19/5244; A61B 5/06; A61F 2/32–2/38
See application file for complete search history.

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(57) **ABSTRACT**

Systems and methods for surgical guidance and image registration are provided, in which three-dimensional image data associated with an object or patient is registered to topological image data obtained using a surface topology imaging device. The surface topology imaging device may be rigidly attached to an optical position measurement system that also tracks fiducial markers on a movable instrument. The instrument may be registered to the topological image data, such that the topological image data and the movable instrument are registered to the three-dimensional image data. The three-dimensional image data may be CT or MRI data associated with a patient. The system may also co-register images pertaining to a surgical plan with the three-dimensional image data. In another aspect, the surface topology imaging device may be configured to directly track fiducial markers on a movable instrument. The fiducial markers may be tracked according to surface texture.

20 Claims, 38 Drawing Sheets